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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,897	05/18/2006	Roland Hoelzl	741124-125	8707

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EXAMINER	
ISLA RODAS, RICHARD	

ART UNIT	PAPER NUMBER
2829	

NOTIFICATION DATE	DELIVERY MODE
03/19/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/595,897	HOELZL ET AL.	
	Examiner	Art Unit	
	RICHARD ISLA RODAS	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *6/13/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13,18,20 and 23* is/are rejected.

7)☒ Claim(s) *14-17,19,21 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/06, 06/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the US Patent to Podhrasky #4,700,139 in view of the US Patent to Suzuki et al. #5,541,552 (Suzuki hereinafter).

In terms of claim 13, Podhrasky teaches a method comprising the steps of energizing at least one transmitting coil with an AC voltage for transmitting a carrier signal to the object (see lines 26-28, col. 11) and receiving at least one of an essentially amplitude-modulated received signal and phase-modulated received signal resulting from the cattier signal by means of at least one receiving coil (see lines 29-30, col. 11), and demodulating the received signal (see lines 33-35, col. 11), said signals are differentiated to produce vectors that are indicative of the signal received by the receiving coil (see lines 45-50 in col. 11).

Podhrasky teaches all of the claimed method steps as explained above, except for the use of a Fourier transformation in order to demodulate the signal, wherein said demodulation provides the calculation of magnitude and phase of the carrier signals. However, the use of Fourier transforms for the demodulation of carrier signals is well known in the art. For example, Suzuki teaches a method of demodulating a signal

conveyed by multiple carriers in which the sampled received signal is supplied to a fat Fourier transform circuit which then performs calculations to obtain phase information among the plurality of received carriers (see lines 12-17, col. 5). Fourier transformations provide the representation of a signal in the frequency domain (taken from its time domain). In the frequency domain, it's easier to predict the signal's frequency response and behavior. It would have been obvious to one of ordinary skill in the art, to use the teachings of Fourier transformations in demodulating schemes, such as that described by Suzuki, to use Fast Fourier in the demodulating step of Podhrasky, since Fourier transformations allow the system to manipulate the signal while in its frequency domain which, as explained above, are far easier to work with compared to untransformed (time domain) signals.

As to claim 18, Suzuki teaches the method of demodulation as explained in terms of claim 13, where the signal received is sampled at a minimum of four points according to Table 1 shown in lines 6-18 of column 3. That is, the system records data of the signal at four points ($\frac{\pi}{4} radians$, $\frac{3\pi}{4} radians$, $\frac{-3\pi}{4} radians$ and $\frac{-\pi}{4} radians$). Then, as explained in lines 21-23, col. 5, the value at each phase is used in the demodulation method.

3. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Podhrasky in view of Suzuki as applied to claim 13 above, further in view of the US Patent to Weaver et al. #5,786,696 (Weaver hereinafter) and further in view of the US Patent to Davarian #4,675,880.

In terms of claim 23, Podhrasky shows in Figure 4, an apparatus for locating a metallic comprising a transmitting coil (14) energized with an AC voltage (sinusoidal signal provided by oscillator 12), a receiving coil (20) for receiving a signal which is then demodulated by demodulating means (16). Podhrasky anticipates all of the claimed elements as discussed above except for the demodulating means (16) being configured to use a Fourier transformation method. In fact, it appears that the demodulator in Podhrasky uses synchronous standard demodulation (through means 16 in Figure 3) instead of using a Fourier transformation method as claimed. However, the use of Fourier transforms for the demodulation of carrier signals is well known in the art. For example, Suzuki teaches a method of demodulating a signal conveyed by multiple carriers in which the sampled received signal is supplied to a fast Fourier transform circuit which then performs calculations to obtain phase information among the plurality of received carriers (see lines 12-17, col. 5). Fourier transformations provide the representation of a signal in the frequency domain (taken from its time domain). In the frequency domain, it's easier to predict the signal's frequency response and behavior. It would have been obvious to one of ordinary skill in the art, to use the teachings of Fourier transformations in demodulating schemes, such as that described by Suzuki, to use Fast Fourier in the demodulating step of Podhrasky, since Fourier transformations allow the system to manipulate the signal while in its frequency domain which, as explained above, are far easier to work with compared to untransformed (time domain) signals.

Also Podhrasky does not teach an analog-to-digital converter. The use of such converters however, is well known in the art. For example, Weaver shows in Figure 4, a system for the detection of metals that converts an analog signal received by a detector coil (100) into a digital signal (using analog-to-digital converter 112) so that the system may work using digitalized signals instead of analog signals. The advantages of using such digitalization of signals are well known in the art. For instance, Davarian teaches a method of processing signals using analog and digital schemes. Davarian teaches that an advantage of using digital techniques over analog techniques is the better control of the spectral null of a processed signal as well as a better extraction of the calibration of a received signal (signal under processing) before demodulation (see lines 43-51 in col. 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made, based on the advantages of digital techniques as disclosed by Davarian, to include an Analog-to-Digital converter as taught by Weaver, in the device of Podhrasky in order to allow the system to work with a digital scheme and thus attain better control of the received signal. Finally, Weaver shows in Figure 1, a housing onto which all elements including coils, the processing unit and the converter is to be housed.

4. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Podhrasky in view of Suzuki as applied to claim 13 above, further in view of the US Patent to Payne #4,110,679 and further in view of Davarian.

In terms of claim 20, Podhrasky in view of Suzuki teach the claimed method except for the step of filtering the received signal at the second coil before the step of

demodulation takes place. The practice of filtering of signals is well known in the art however. For example, Payne shows in Figure 1, a metal detector which uses a first coil (20) to transmit a signal and second coil (22) to receive a response which is then filtered by a low pass filter (28) before it is sampled and demodulated by means 30 and 18 respectively. By doing so, the system ensures that unneeded signals in the high frequency range are not analyzed (sampled and demodulated) by the system, which prevents the waste of systems' resources and hence, allows the system to perform more efficiently. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the teaching of filtering pre-demodulation, as taught by Payne to include a filtering system in the method of Podhrasky, in order to prevent the unnecessary processing of unwanted signals which frequencies are too high or too low to be of any use to the system, thus ensuring the efficient use of the system's resources. It must be noted that at least the those harmonics produced at the filtered high frequencies are also eliminated since the Low-pass filter prevents such high frequencies from being further appearing in the system.

Payne does not teach the filter to be a digital filter (it appears the filter used in Figure 1 is of the analog type). However, the advantages of using digital techniques over analog techniques are well known in the art. For instance, Davarian teaches a method of processing signals using analog and digital schemes. Davarian teaches that an advantage of using digital techniques over analog techniques is the better control of the spectral null of a processed signal as well as a better extraction of the calibration of a received signal (signal under processing) before demodulation (see lines 43-51 in col.

8). It would have been obvious to one of ordinary skill in the art at the time the invention was made, based on the advantages of digital techniques as disclosed by Davarian, to perform the filtering in Payne's system through a digital scheme, in order to attain better control of the filtered signal.

Allowable Subject Matter

5. Claims 14-17, 19 and 21-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In terms of claim 14, the prior art of record does not teach alone or in combination a method for locating a metallic object including the step of multiple demodulation of the received signal, wherein said calculating step also comprises calculating a spectrum when the at least one of the associated magnitude value and phase values are calculated for frequencies of the carrier signal, <u>in combination with all other elements in claim 14</u>.

As to claims 15-17, the claims are allowed as they further limit allowed claim 14.

In terms of claim 19, the prior art of record does not teach alone or in combination a method for locating a metallic object wherein intermittent data acquisition is performed with less than 1 sample being detected and processed per full wave of the carrier signal, <u>in combination with all other elements in claim 19</u>.

In terms of claim 21, the prior art of record does not teach alone or in combination a method for locating a metallic object wherein the digital filtering is

provided for the demodulated signal using a mathematically assigned digital low-pass filter that has a width that is varied as a function of the number of digitally determined measured values being fed to a respective Fourier or wavelet transformation, in combination with all other elements in claim 21.

As to claim 22, the claims are allowed as they further limit allowed claim 21.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Document Number Number-Kind Code e.g. 0500004 A1	Date MM-YYYY	Name	Classification
4,942,360	07-1990	Candy, Bruce H.	324/329
5,525,907	06-1996	Frazier, Lawrence M.	324/334
3,848,182	11-1974	Gerner et al.	324/233
4,322,683	03-1982	Vieira et al.	324/225
4,230,987	10-1980	Mordwinkin, George	324/236
4,755,753	07-1988	Chern, Engmin J.	324/237
6,583,625	06-2003	Castle, Jonathan	324/329

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Isla-Rodas whose telephone number is (571)

272-5056. The examiner can normally be reached on Monday through Friday 8 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha Nguyen can be reached on (571) 272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Richard Isla-Rodas
February 29, 2008

/Ha T. Nguyen/
Supervisory Patent Examiner, Art Unit 2829